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ABSTRACT

This paper outlines the design of two Comparative Studies of Phase IV of the Individually Guided Education (IGE) Evaluation Project. More than 2,000 elementary schools in 25 states use the IGE system. The Evaluation Project was designed to gain a comprehensive view of the system's operation and effectiveness. Phase IV investigated pupil outcomes, instructional time, and means of instruction. It focused on two IGE curriculum programs designed for compatibility with instructional programming for the individual student: (1) the Wisconsin Design for Reading Skills Development (WDRSD); and (2) Developing Mathematical Processes (DMP). Second and fifth grade students and their teachers in three types of schools were studied: (1) IGE schools using DMP or WDRSD; (2) Non-IGE schools using DMP or WDRSD; and (3) IGE schools using neither program. Data were collected during the 1978-79 school year from achievement monitoring and domain referenced tests, teacher logs, classroom observations, and questionnaires which served as the basis for structured interviews with school staff. Pupil attainment of specified program objectives was contrasted in IGE schools using different programs and in IGE and non-IGE schools using WDRSD or DMP. Regression analyses were performed using the residual gain score as the dependant variable and instructional time, means of instruction, and school variables as the independent variables. (BS)

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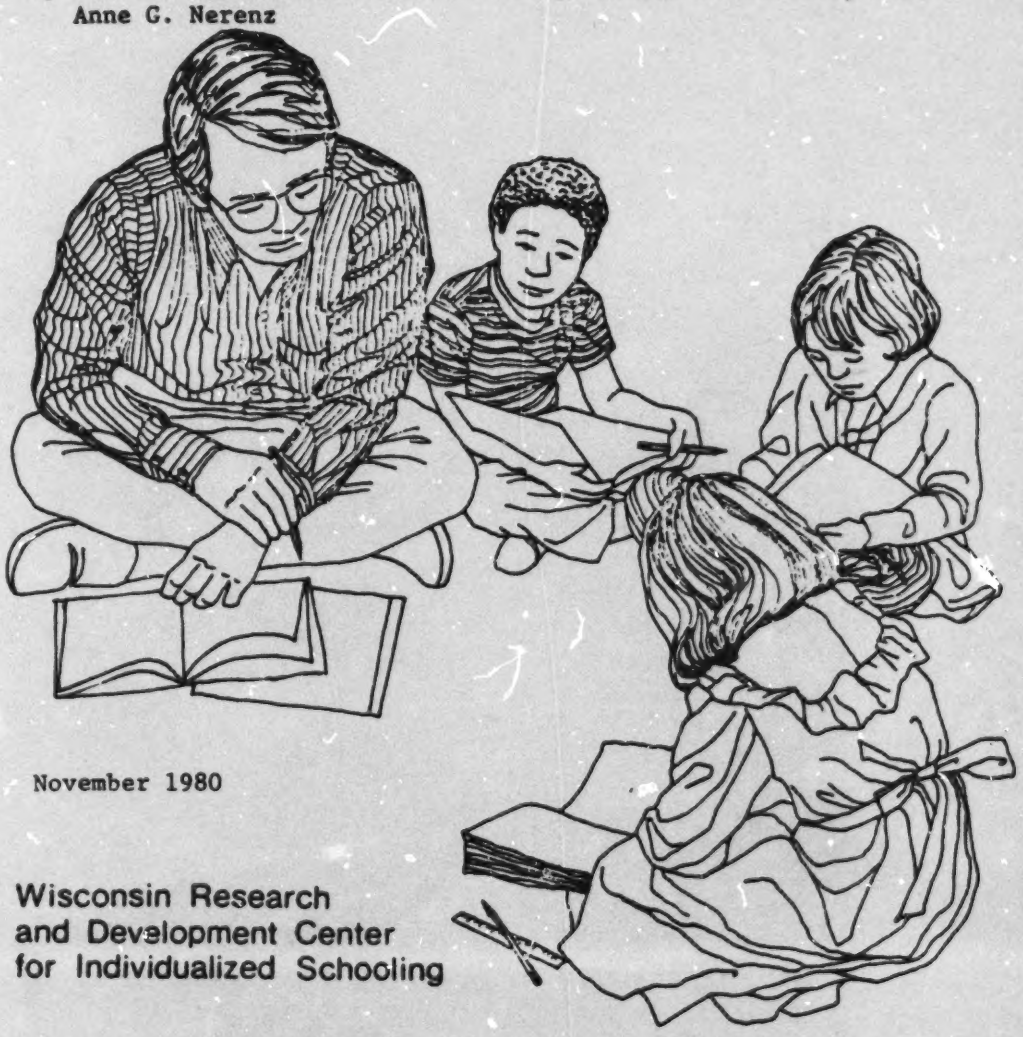
Phase IV

Project Paper 80-2

THE DESIGN OF THE IGE EVALUATION PROJECT PHASE IV COMPARATIVE STUDIES

COMPARATIVE STUDY OF PHASE IV IGE EVALUATION PROJECT

by Thomas A. Romberg, Norman L. Webb, Deborah M. Stewart, and Anne G. Nerenz



November 1980

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Report from the
IGE Evaluation Project

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- providing assistance to educators which helps transfer the outcomes of research and development to improved practice in local schools and teacher education institutions

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Table of Contents

	Page
Table of Figures	vii
Introduction	1
IGE and the Evaluation Project	1
Overview of Phase IV	6
The Comparative Studies	9
Model for the Studies	10
Sample	12
Data Collection	13
References	25

List of Figures

Figure		Page
1	Framework for an IGE evaluation	22
2	Phase I structural model predicting student achievement	23
3	Phase IV Model of anticipated relationships between variables . .	24

This paper outlines the design of two Comparative Studies of Phase IV of the Individually Guided Education (IGE) Evaluation Project. Phase IV is one of five related phases comprising an extensive study designed to evaluate IGE. It attempted to describe how instruction in reading skills and mathematics is carried out in IGE and non-IGE settings in which curricular materials designed to be compatible with the IGE instructional programming model were used.

IGE and the Evaluation Project

Through the combined efforts of the Wisconsin Research and Development Center for Individualized Schooling, the University of Wisconsin IGE Teacher Education Project, the Kettering Foundation (I/D/E/A), and IGE coordinators in 25 states, more than 2,000 elementary schools have adopted a system called Individually Guided Education (IGE).

IGE is a complex system based on theoretic and pragmatic ideas about schooling, children's learning, and the professional roles of school staffs. This system contains seven components:

1. Multiunit organization,
2. Instructional programming for the individual student,
3. Assessment and evaluation for educational decision making,
4. Curriculum and instructional materials and activities for each child's instructional program,
5. Home-school-community relations programs,
6. Facilitative environments for professional growth, and

7. Continuing research and development for system improvement.

Each of these seven components was developed as the result of an extensive collaborative study by scholars and professional educators.

Four types of variables were identified to guide the evaluation of IGE: pupil and staff outcomes, means of instruction, support systems, and pupil and staff background. With these variables in mind, a descriptive framework was developed that considers outcomes of IGE as a function of both instructional means and the degree of implementation (Romberg, 1976). Figure 1 shows how the four types of variables are related.

1. Pupil and staff outcomes, and the extent to which these outcomes have been attained, should be the initial basis of an IGE evaluation. Both pupil and staff outcomes are illustrated in Figure 1 as being multivariate and multilevel. In this study a set of curriculum-specific pupil achievement scores in reading and mathematics will be used.

2. The instructional means of formal schooling must be a second basis for an evaluation of IGE. It has been fashionable in evaluation circles to concentrate on ends or outcomes and to ignore the means by which they are reached. Reform movements, such as IGE, invariably attack the properties of means. To this extent, judging the value of the means is as important as assessing outcomes.

The means of instruction considered in the evaluation project were separated into three sets of activities based upon the operating

characteristics of IGE schools: staff activities of the Instructional Improvement Committee (IIC) and the Instruction and Research Units (I & R Units), activities of the staff teacher both in curriculum management and pupil interactions, and activities of pupils as they are related to reading and mathematics instruction. It is this latter set of activities that is to be examined in detail in the Comparative Study of Phase IV.

3. The degree to which, and the way in which, support systems of IGE have been incorporated and developed in a school must be judged. The seven components of IGE have evolved as practical features which are needed to support new instructional methods which in turn produce desired pupil and staff outcomes. It can be argued that the efficiency of an IGE school depends upon the components which have been implemented and the manner in which they are operating.

The support systems for an IGE learning environment were separated into four categories as indicated in Figure 1. The second category, curricular materials compatible with instructional programming and evaluation (IGE Component 4), is shown by identifying the three major curricular products developed for IGE, the Wisconsin Design for Reading Skill Development (WDRSD) (Otto, 1977), Developing Mathematical Processes (DMP) (Romberg, 1977), and the Pre-Reading Skills Program (PRS) (Venezky & Pittelman, 1977). The functional relationships illustrated in Figure 1 convey the following premises: (a) the degree to which IGE support systems have been implemented, together with

pupil and staff backgrounds, directly influences the means of instruction in an IGE school; and (b) the means of instruction, along with pupil and staff backgrounds, account for pupil and staff outcomes.

Although much has been written about the conceptual background of IGE, no comprehensive picture now exists which shows the manner in which IGE has been implemented in elementary schools. Thus, the IGE Evaluation Project was designed to evaluate IGE in order to gain a more comprehensive view of the system's operation and effectiveness. The desired outcome is to identify which features contribute most to the success of reading skills and mathematics instruction as a result of individualized schooling.

The evaluation project consisted of five phases which were organized to provide complementary information of individually guided instruction. Phase I was a large sample study which provided basic information about IGE schooling. Certain features of IGE schooling have been reputed to be crucial to IGE success. The purpose of Phase I, then, was to examine the extent to which those presumably essential features had been implemented among IGE schools and to assess the effectiveness of that implementation. In this large sample study, including approximately 155 IGE schools, information was obtained from IGE school staff members using self-report surveys and from students using standard paper-and-pencil instruments. The data were intented to provide a functional understanding of IGE features,

processes, and outcomes by relating a broad scope of variables in an interpretive manner(Price, Janicki, & Romberg, 1980).

Phase II verified and extended the self-report data gathered in Phase I to include more fully the range of variables that determine the process of schooling (Ironside & Conaway, 1979).

Phase III focused on the social meaning which emerges as IGE is implemented on a day-to-day basis. The problem of understanding the impact of educational reform can be approached by viewing schools as social institutions whose characteristics shape and are shaped by the behaviors of their members. This focus allows us to think of a school as a complex social arrangement consisting of underlying patterns of conduct which channel thought and action within that setting (Popkewitz, Tabachnick, & Wehlage, in press).

Since the success of IGE depends heavily on the availability of materials and evaluative procedures which are compatible with instructional programming for the individual student, an analysis of curriculum products designed to be used in IGE settings was undertaken. This aspect of the Phase IV project sought to determine the extent to which the three curricular programs developed for IGE met their objectives and to clarify the relationship of pupil outcomes to instructional time and means of instruction. In addition, Phase IV provides information about pupil activities and learning outcomes as they relate to specific objectives.

Finally, the goal of Phase V is to synthesize the results of Phases I through IV and to address the significant issues in contemporary schooling raised by the project as a whole. Thus, each phase of the evaluation was designed to complement and strengthen the validity of the data gathered by the previous phases. For example, data on means of instruction, gathered by the large-sample study of Phase I, are examined in somewhat greater depth in fewer schools by the Phase II studies. Phase III's analysis develops a view of instruction from a different perspective. Phase IV explores means of instruction within the specific curricular areas of reading skills and mathematics. Thus, instead of merely adding together summaries of the different evaluation phases, Phase V is designed to integrate and interpret the data from all the phases into a series of statements about what implications the project has for educational issues.

Overview of Phase IV

The intent of Phase IV was to describe in considerable detail the actual operating characteristics of a sample of schools which were using curriculum materials designed to be compatible with IGE. Phase IV was restricted to the investigation of three groups of variables--pupil outcomes, instructional time, and means of instruction-in IGE and non-IGE settings in which the Center's curriculum programs as well as alternative curriculum materials were being used. Pupil attainment of program objectives is the main

variable. The other two variables, instructional time and means of instruction, are essential in explaining and understanding how the programs work and how objectives are obtained. These two variables are also important from a practical point of view because they are variables that can be manipulated by teachers. Describing the use of each program in terms of allocated time, engaged time, and instructional activities provides concrete factors that teachers work with.

In addition, instructional time was included because of recent studies and reviews that stress its importance and its relationship to pupil outcomes (Harnischfeger & Wiley, 1975; Rosenshine, 1977; McDonald & Elias, 1976; and Fisher et al., 1975). As Harnischfeger and Wiley state, "All influences on pupil achievement must be mediated through a pupil's active and passive pursuit" (1975, p. 15). Certainly, there is enough evidence to suggest that instructional time, as a measure of pupil pursuits, is important. Its use as a variable in Phase IV, then, has two purposes. First, the amount of time during which students are actively engaged in learning when using one of the three programs will be a means of describing how the programs are being used. The assumption is that the programs should maximize student engagement by attending to the individual's needs. Second, Phase IV provides an excellent opportunity to study in more detail the relationship of pupil outcomes to instructional time.

In summary, the primary purposes of Phase IV are:

1. to determine the degree to which WDRSD and DMP meet their objectives of having students master specified objectives and skills;

2. to determine how time is allocated for instruction in implementing WDRSD and DMP;

3. to relate instructional time to the means of instruction and mastery of content for WDRSD and DMP; and

4. for each curriculum program, WDRSD and DMP, to contrast two situations-IGE schools using the program with non-IGE schools using the program and IGE schools using the program with IGE schools using alternative programs--on the variables of pupil outcomes, instructional time and means of instruction.

Five studies were conducted as part of Phase IV, three Descriptive Studies and two Comparative Studies. The Descriptive Studies were small sample studies designed to describe how the curriculum programs DMP, WDRSD, and PRS were being used in IGE schools. The studies were conducted during the winter and spring of 1978 at two IGE schools using DMP, two IGE schools using WDRSD, and three IGE schools using PRS. Achievement monitoring and domain referenced tests, observations, teacher logs, and questionnaires were used to collect the data, and one purpose of the Descriptive Studies was to refine these procedures for subsequent use in the Comparative Studies. A more detailed description of the Descriptive Studies is given in Project Paper 79-42 (Webb & Romberg, 1979). The two Comparative Studies also focused on the use of WDRSD and DMP in IGE settings.

The Comparative Studies

Data were gathered for the Comparative Studies from October until May during the 1978-79 school year. Three types of schools were included in the study:

1. IGE schools using DMP or WDRSD
2. Non-IGE schools using DMP or WDRSD
3. IGE schools using neither program

Briefly, the procedures followed in the Comparative Studies were as follows: Four triads of schools were selected for WDRSD and three triads for DMP; each triad contained one school of each of the three types. Only students in Grades 2 and 5 and their teachers participated in the study. Data were collected by four means: tests on general objectives of each curriculum program, observations of specific students during the reading or mathematics instructional period, teacher logs for reading or mathematics instruction of specific students, and questionnaires which served as the basis for structured interviews with school staff. The tests were administered eight times during the year with the first testing in October 1978 and the last in May 1979. Each testing was separated by approximately three weeks of instruction, during which formal observations were made at each grade level with a total number of observations for the 25-week study ranging from 16 to 20. In addition, teachers maintained daily logs for a sample of pupils over the entire testing observation period, recording the amount of time allocated for instruction by objective for each target pupil as well as the type of materials and grouping used during instruction. In addition, data

on school and staff background variables and on curriculum use variables were obtained in structural interviews with teachers, unit leaders, and principals.

Model for the Studies

A structural model for predicting student achievement was developed for Phase I and is shown in Figure 2 (Price, Janicki, Howard, Stewart, Buchanan, & Romberg, 1978). This model was developed from the three premises on which IGE is based. They are:

1. Certain organizational features make it more likely that certain desirable instructional practices will occur. These organizational features also make it more likely that the staff will be satisfied with their jobs.

2. The use of certain curriculum materials and associated systems of information collection and record keeping makes it more likely that certain desirable instructional practices will occur.

3. Those instructional practices which are deemed desirable in IGE make high student achievement more likely. They also make it more likely that desirable changes in other student characteristics, such as self-perception and locus of control, will occur.

Data on the first premise were organized into six variables: Inter-organizational Relations (IOR), Procedures Fostering Coordination and Improvement of the School Program (COS), Intraorganizational Structure (IOS), General Staff Background (GSB), Belief in Individual Differences (INDIV), and General Implementation of the Instructional Programming Model (IPM). These describe in detail the organizational structure and staff background in the school. Four variables were developed in response to the second premise. These curriculum-specific variables are: Utilization of Curriculum Resources (UCR), Information Acquisition (IA), Individualization of Instructional Decisions (IDM), and Management of

Grouping and of Instructional Continuity (IE). A single variable--Student Achievement--includes the pupil outcomes discussed in the third premise. With the exception of the achievement measures, data on all of the variables in the Phase I model were collected using teacher, general staff, and principal questionnaires.

In contrast, Phase IV was designed to provide more detail on the last two premises posed in Phase I, with specific attention paid to means of instruction and curriculum-related student achievement, while providing sufficient background information that each school in the smaller Phase IV sample might be related on several significant dimensions to schools in the larger Phase I sample as a whole. Thus, some information was collected on five of the six school-wide variables used in Phase I--General Implementation of the Instructional Programming Model (IPM), Intraorganizational Structure (IOS), Procedures Fostering Coordination and Improvement of the School Program (GOS), Interorganizational Relations (IOR) and General Staff Background (GSB). In Phase IV the Program Use variables--Curriculum Implementation and Program Customizing--included the kinds of information provided in the Phase I curriculum-specific variables. More detailed information about classroom procedures and achievement outcomes was also collected in Phase IV. A model depicting the Phase IV variables and the anticipated relationships is shown in Figure 3.

Four groups of variables are shown in Figure 3--school background, curriculum program use, classroom activities, and pupil outcomes. As stated above, the school variables, which were assessed through structured

interviews with school staff, provide a link between the Phase IV sample and the larger Phase I sample. Curriculum program use variables, also measured through structured interviews, have a linking function to Phase I and provide a descriptive background for the measures of classroom procedures. These procedures were assessed through logs maintained by teachers for selected students and through observations in the classrooms; means of instruction and the use of instructional time are detailed measures of how programs are used in classrooms and relate directly to pupil attainment of objectives. Pupil outcomes have been specified in terms of specified objectives of the curriculum programs; they are assessed through achievement monitoring procedures and, for the DMP Study, domain referenced procedures.

Sample

Four WDRSD triads and three DMP triads were identified to participate in the studies. Each triad was to have one school of each of the three types. Schools within each triad were matched according to location, socio-economic level, composition of student body, size, and, for the IGE schools, "IGE-ness." The same demographic categories used in Phase I were used to classify the communities in which the schools were located:

1. Extreme rural--community under 3,500, residents primarily farmers or farm workers
2. Small place--community under 25,000
3. Medium city--community between 25,000 and 200,000
4. Main big city--community within a city over 200,000

5. High metro--area in a city with a population over 150,000 where many residents are in professional or managerial positions
6. Low metro--area in a city with a population over 150,000 where many residents are on welfare or are not regularly employed
7. Urban fringe--suburb of a city greater than 200,000

The four triads of schools in the WDRSD study represented extreme rural, small place, medium city, and urban fringe. One urban fringe IGE school not using WDRSD withdrew from the study just prior to the beginning of the data collection. Thus, the urban fringe group was reduced to two schools, an IGE school and a non-IGE school, both using WDRSD, bringing the total number of schools in the WDRSD study to eleven. The three triads of schools in the DMP study represented extreme rural/small place, medium city, and urban fringe. One IGE school using DMP from a medium city withdrew from the study at the last minute reducing the number of schools in the DMP study to eight.

Data Collection

Pupil outcomes. An achievement monitoring procedure with item sampling was used to collect data on the attainment of objectives. Both the DMP and WDRSD programs contain units of instruction--topic for DMP and skills for WDRSD--and are based on the instructional programming model (IPM). Once a pupil has mastered the objectives of a topic or skill, the pupil is to be regrouped with other pupils with similar needs and given instruction on a new topic or skill. The instructional sequence of topics or skills should vary from pupil to pupil. Because of this variation in the instructional programs which pupils receive, an achievement

monitoring procedure in which tests were administered at eight points during the school year was chosen to provide information on the attainment of objectives. Such a procedure is more sensitive to the individualization of the programs than other designs, such as pre- and posttesting.

The tests used in the Descriptive Studies (Webb & Romberg, 1979) were refined for use in the Comparative Studies. The tests were compiled by identifying 25 WDRSD Skills for Grade 2, 26 WDRSD Skills for Grade 5, 12 DMP objectives for Grade 2 and 14 DMP objectives for Grade 5. Two to four test items for each of the WDRSD Skills and four test items for each of the DMP objectives were then prepared to form an item pool for each grade level for each program. Items from each pool were distributed among four forms using an item sampling technique. For the Comparative Studies, all achievement monitoring test items were constructed in a multiple-choice format and used terminology which would be understood by pupils using programs other than the curriculum under consideration.

The achievement monitoring tests were administered eight times during the school year. The pupils at each grade level were divided at random into four groups and the four test forms at each level were rotated among the groups so that each group was given a different form of the test for any consecutive testing and, over the school year, each student took each form twice. The maximum time for any one testing for a student was 50 minutes.

A second testing procedure was used to measure achievement on three specific math objectives at each of the two grade levels at the eight

schools participating in the mathematics study. Domain-referenced tests were administered three times--at Test Time 1 (October, at Test Time 4 (January), and at Test Time 8 (May). This procedure was used in order to test key objectives in more detail and to provide a measure of pupil outcomes on the general concepts and ideas associated with the objective domain as well as specific skills needed to perform the individual items. For example, for the Grade 2 objective of counting objects in sets from 0-99, the analysis of the domain-referenced tests provided measures of the ability of the group of pupils to count the objects as well as the pupils' specific problems in counting objects grouped in different ways (e.g., by fives, sixes, and tens). The domain-referenced procedure was not used in the reading skills Comparative Study because of the results of using this procedure in the WDRSD Descriptive Study. Identifying the domains for the specific reading skills was much more difficult than for math objectives and resulted, in general, in spurious results.

For each of the three test times the domain-referenced tests were administered, a set of ten items was randomly chosen from the specified domain of items for each of the three objectives for the grade level. All items were open ended and required the pupils to supply the answer in order to minimize guessing. The Harris-Pearlman (1978) procedure was used to separate the item difficulty into two factors, one representing the domain difficulty and the other representing difficulty with the specific item. Also, since all students took the same tests, the domain-referenced tests can be used to compare the representativeness

of the outcomes of the target students to the group from which they were selected. The testing time for the domain-referenced tests was approximately 40 minutes.

Observations. The observation system is the same as the one in the Phase IV Descriptive Study (Webb & Romberg, 1979). Initially, six target students were randomly identified in the unit or class. The target students changed over the year, since in some IGE situations students are regrouped periodically, making it often physically impossible to observe the same six students. These students were observed in sequence using a time sampling procedure. The first target student was observed for a moment and his or her activity was coded. Then the next target student was observed for a moment and his or her activity coded. The procedure continued until all six target students had been observed, taking approximately 3 minutes. Thirty seconds were then taken to record the major role of the teacher(s) and general activities occurring in the classroom. This cycle was repeated, observing each target student in sequence and recording general comments, during the time allocated for work on the curriculum program.

Seven major categories of data were coded:

1. General content--time devoted to other than the curricular program being observed
2. Specific content--math objective or reading skill
3. Pace--whether or not the student is working at his or her own pace
4. Grouping--size of group of which the student is a member
5. Materials--the materials being used by the student

6. Learner moves--student engagement or non-engagement

7. Interaction--persons with whom the student is interacting and the direction and focus of that interaction

The event occurring at the moment the target student was observed was characterized by checking subcategories under each of these main categories. This observation system was used to provide measures on the amount of time spent in general content areas such as waiting, transition, and management and, for specific content areas in reading and math, measures of the amount of time spent by students with different types of groupings, materials, and interactions as well as different types of engagement.

The observers were trained to use the observation system in a four-day training workshop held in Madison in October 1978. The first day of the workshop was spent reviewing the materials and procedures used in each of the programs and explaining the observation system. Then the observers spent three days at a school doing observations and discussing the coding procedures. Percentage agreement on individual events and intercoder reliabilities on sums over events were calculated to assess the level of proficiency that the observers had attained in using the observation procedures. In addition, a sample of schools were visited during the year to check the percentage agreement and intercoder reliability. The observers also returned for a two-day retraining session in February 1979, most of which involved observations in schools to check on the intercoder reliabilities.

Teacher logs. Teachers who were directly responsible for the mathematics or reading skills instruction of the students in the target population were asked to keep daily logs for six to eight students, including those students being observed, in order to obtain a measure of the total time allocated to instruction on specific objectives over the investigation period. On the logs the teachers recorded the amount of instructional time which was allocated to specific math or reading skills as well as the group size and type of materials used during instruction.

Interviews. In each school, structured interviews were conducted by the observer for that school with members of the Grade 2 and Grade 5 instructional staff and with the principal. Background information about the school, the staff, and use of the reading or mathematics curriculum products was obtained from these interviews. The questionnaires used as the basis for the interviews were developed from two sources: the Phase I survey instruments and the curriculum developers' questionnaires about product use.

Instructional staff provided information about their own teaching experience, how the curriculum product was used, and how the overall instructional program was planned and carried out. Each principal described the school's organization, its relationship to other educational agencies, and some procedural aspects of the school's ongoing operation.

Data analyses. The analyses of the data for the Comparative Studies were guided by the four purposes related to the general goals of Phase IV (see page 8).

Central to the analyses are two contrasts: IGE schools using WDRSD or DMP with IGE schools using alternative programs, and IGE schools using WDRSD or DMP with non-IGE schools using WDPSD or DMP. Pupil attainment of specified program objectives thus was contrasted in IGE schools using different programs and in schools that were IGE and non-IGE using the program under study, WDRSD or DMP. Additional contrasts were made related to allocated time, pupil use of instructional time, and the means of instruction provided. Analyses were performed by grade level, Grades 2 and 5, for each general objective area within reading skills and mathematics, the unit of analysis being the school. In addition, the objectives for mathematics and reading skills were aggregated for analysis to form more general content areas and some aggregations were done on the means of instruction variables by consolidating grouping, materials, and some of the interaction categories.

In describing the variables for the individual schools and school/program types, the objective easiness achievement measures (a percentage of correct responses to total possible responses) were reported for each content area. Residual gain scores (final achievement less the predicted achievement based on prior achievement scores) were used as measures of gain in achievement. Time was used as the metric for describing the means of instruction variables: The time observed for each variable was used to determine the percentage and relative use of the variable.

A measure of the content covered was provided for each general objective by reporting the total time in hours allocated to the objective and its percentage of the total time allocated to mathematics or reading

skills. Allocated time was determined by teacher logs. Of interest are the extent to which the content covered varied by school type and curriculum program or by school within a type as well as the extent to which there are similarities among schools using the same program. School and background information were reported from the information collected by the questionnaires.

For the math schools only, a more refined look at achievement on three specific objectives for each grade was done using the results of the three administrations of the domain-referenced tests. The Harris-Pearlman (1979) analysis was used to identify the proportions of the item difficulty due to the domain ($\hat{\kappa}$) and due to the individual item. These statistics were used to report the change in achievement on the general concept of the domain as well as on specific skills within the domain.

The relationships among variables will be determined by regression analyses. Regression analyses will be performed using residual gain score as the dependent variable and instructional time, means of instruction, and school variables as the independent variables. The purpose of the regression analyses is to determine which variables have the greatest value in predicting achievement gain. The number of variables that can be included in a regression equation is limited, however, because of the relative small number of schools in the studies--eleven for reading skills and eight for mathematics.

After examining the base data, a set of from 6 to 10 priority questions

were identified and examined in detail via iterative analysis. The answers to these questions will be summarized in two technical reports, one for the DMP study and one for the WDRSD study. Both reports will carefully examine the general notion that increased instructional time leads to increased achievement. An initial review of the data suggested that this notion is not always true. The reports also consider the validity of the labels--IGE school, DMP user, WDRSD user--used to differentiate schools in the studies.

Differences in the programs under study will result in different emphases in the two reports. DMP is a complete instructional program for mathematics. Analysis of DMP results will provide an example of how any curriculum program can be analyzed and the parts of the program common across schools can be identified. WDRSD is a management system for reading skills instruction in general. The greater emphasis on word attack skills at Grade 2 and comprehension and study skills at Grade 5 will result in different discussions for the two grades.

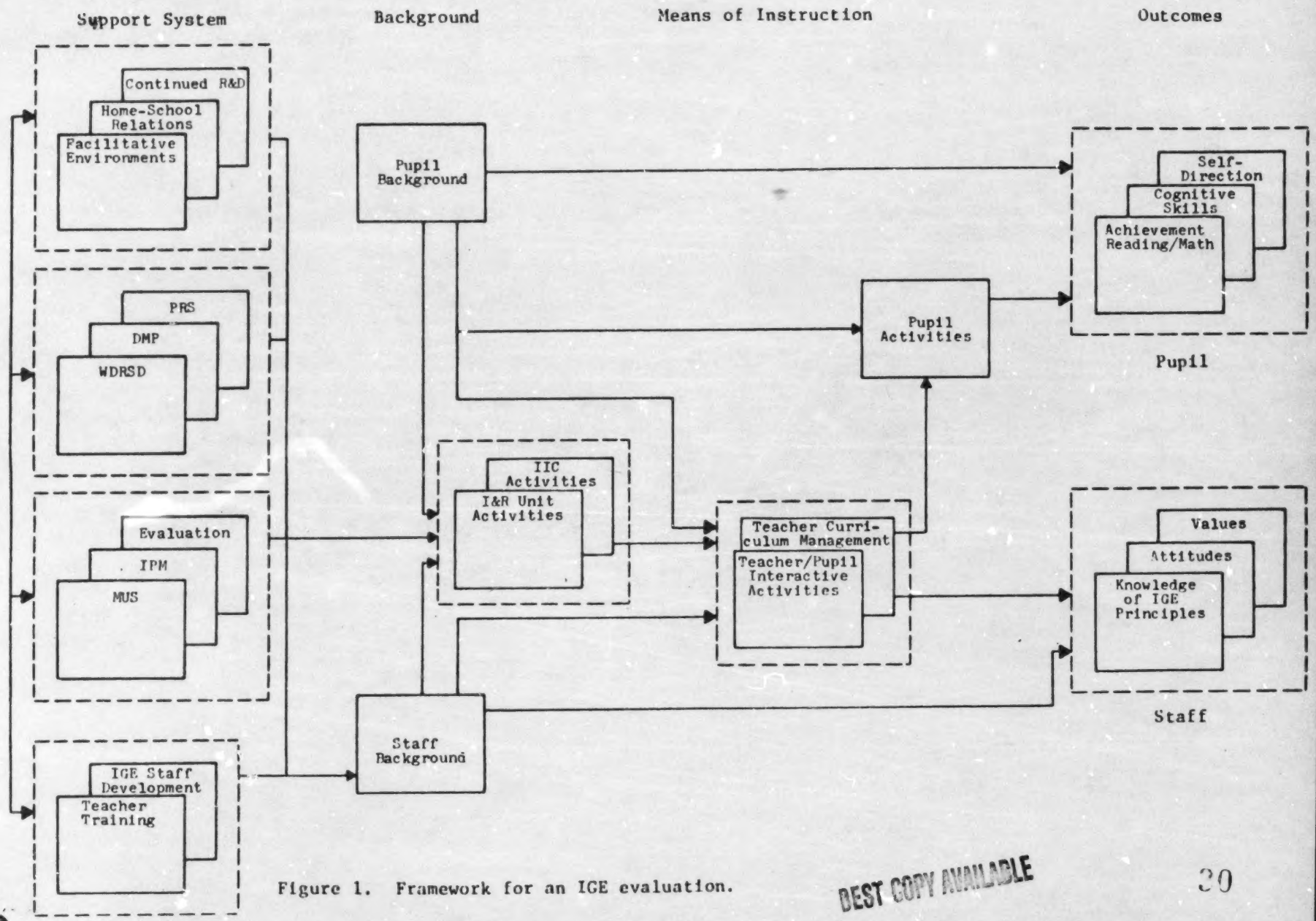

Figure 1. Framework for an IGE evaluation.

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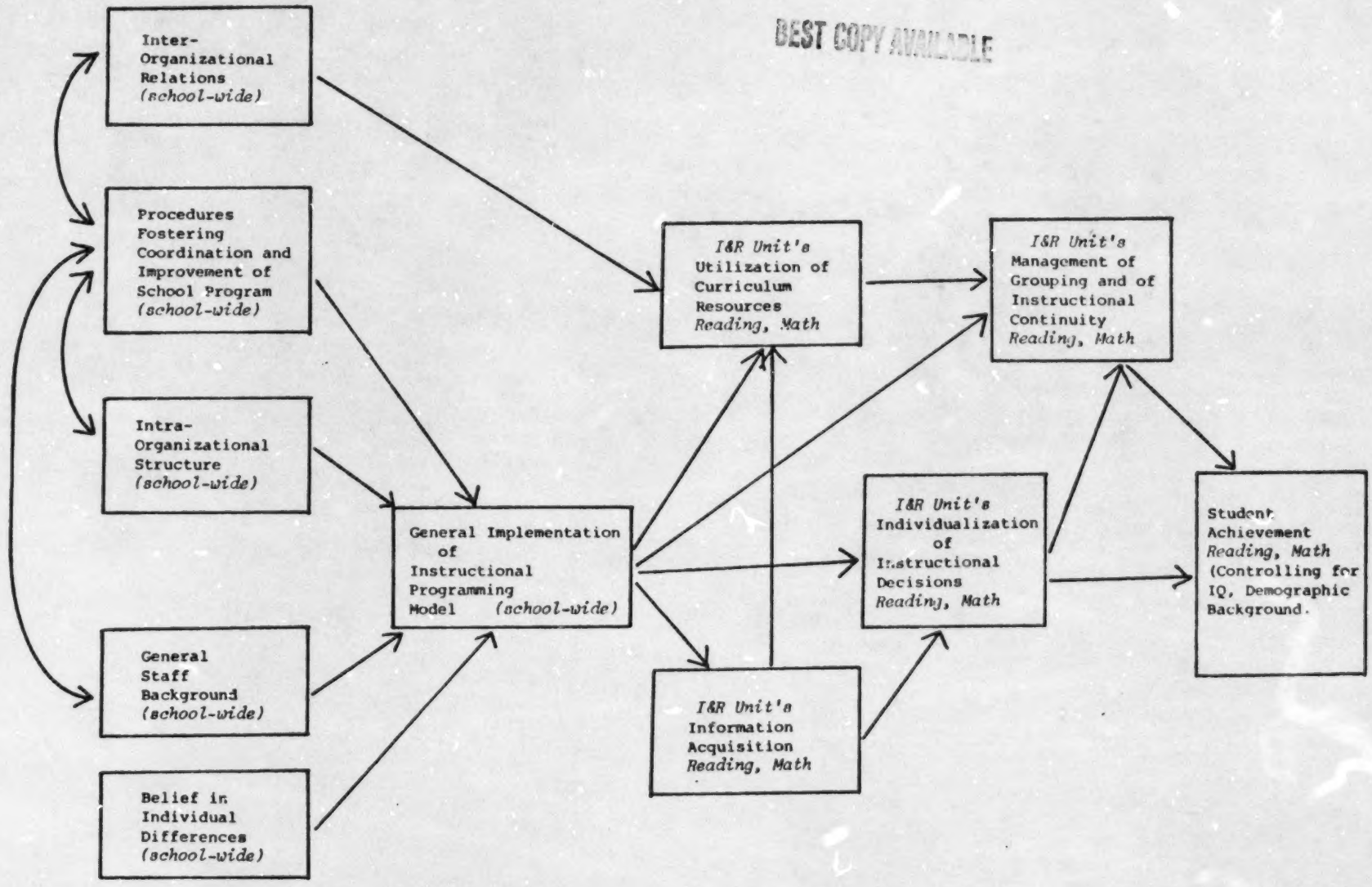
Inter-Organizational Relations (school-wide)
Procedures Fostering Coordination and Improvement of School Program (school-wide)
Intra-Organizational Structure (school-wide)
General Staff Background (school-wide)
Belief in Individual Differences (school-wide)
General Implementation of Instructional Programming Model (school-wide)
I&R Unit's Utilization of Curriculum Resources Reading, Math
I&R Unit's Information Acquisition Reading, Math
I&R Unit's Individualization of Instructional Decisions Reading, Math
I&R Unit's Management of Grouping and of Instructional Continuity Reading, Math
Student Achievement Reading, Math (Controlling for IQ, Demographic Background.

Figure 2. Phase I structural model predicting student achievement.

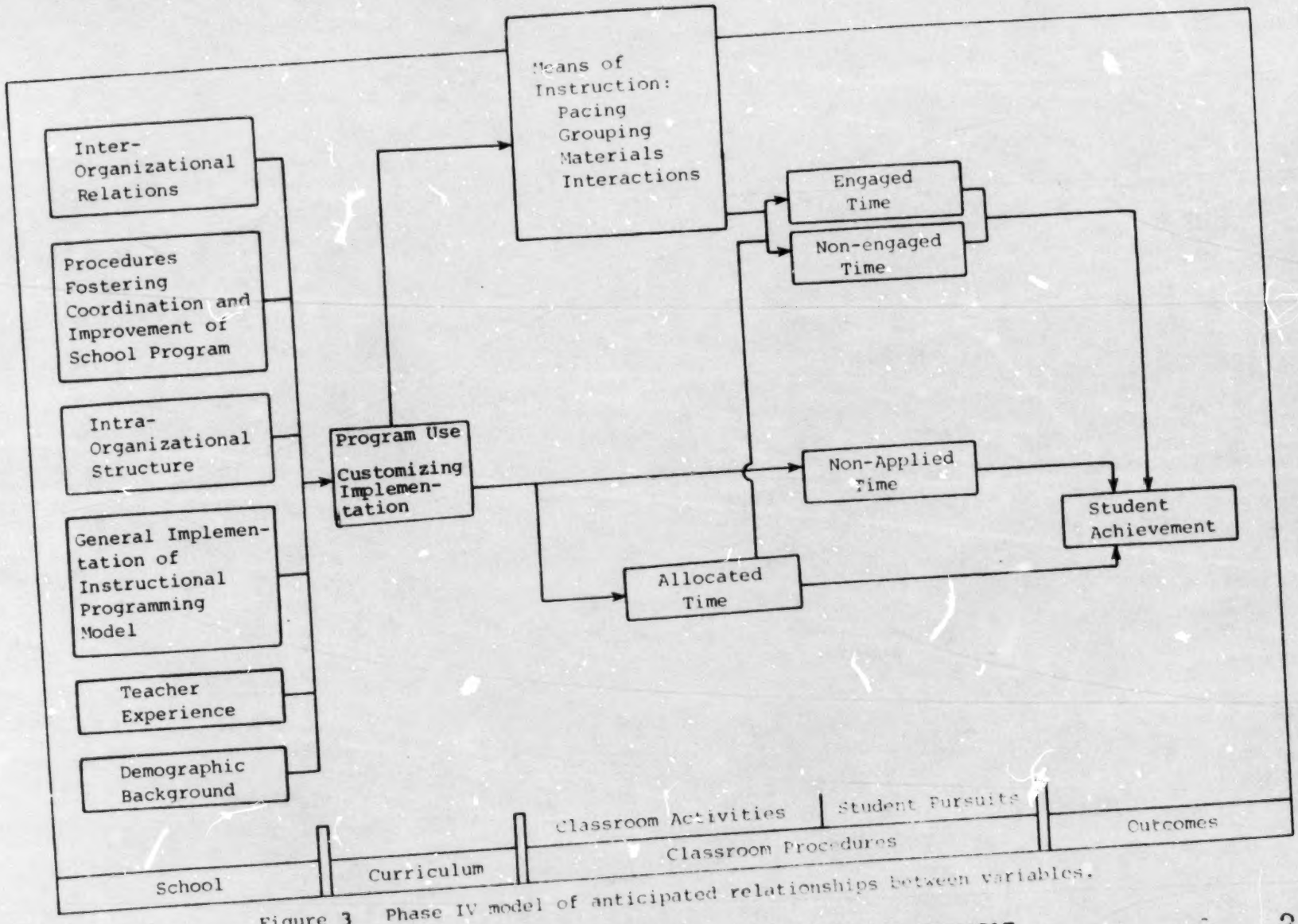

Figure 3 Phase IV model of anticipated relationships between variables.

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